

## Entomological Literature.

A GENEALOGIC STUDY OF DRAGON-FLY WING VENATION. By JAMES G. NEEDHAM, of Lake Forest College, Lake Forest, Illinois. Proceedings U. S. National Museum, xxvi, pp. 703-764, pls. xxxi-liv, 44 text figs. Washington, 1903.

This is that "extended paper upon the venation of this order" that we were promised in *The American Naturalist* for December, 1898, and which certain of us have been eagerly expecting. The realization is not disappointing, for here is a wealth of structural details and of suggestions, often of proof, as to the meaning and use of those details. The subject matter is technical and special, and only those who will carefully study the numerous and excellent plates and figures will really appreciate the text. The Odonate wing is treated by areas, as those of the stigma, the nodus, the quadrangle, and the anal loop. An important "summary of the more general tendencies of vein evolution within the order" is given on pages 730 and 731.

The lines of specialization of venation are traced, first for the Anisoptera, then for the Zygoptera, leading to "a scheme of sub-families for the order which seems to me to be, in the light of the evidence that present knowledge of venation affords, an approximation toward equivalent values for these groups." This scheme follows:

Anisoptera: Family *Æschnidae*, subfamilies 1. Gomphinae (recent and fossil), 2. Petalurinae (r., f.), 3. Stenophlebinæ (f.), 4. Cordulegasterinae (r., f.), 5. Chlorogomphinae (r.), 6. *Æschniinae* (r., f.), 7. *Æschniidinae* (f.), 8. Heterophlebinæ\* (f.).

Family Libellulidae, subfamilies, 9. Macromiinae (r.), 10. Cordulinae (r. f.), 11. Libellulinae (r. f.).

Zygoptera: Family Calopterygidae, subfamilies, 12. Palæophlebinæ† (r.), 13. Epallaginae (r. f.), 14. Vestalinae (r.) 15. Thorinae (r.)

Family Agrionidae: subfamilies, 16. Lestinae (r. f.), 17. Agrioninae (r. f.).

It will be noted that the Anisoptera begin this series. The relative

\* Placed among the Calopterygidae, in the table on page 750, but belonging to the *Æschnidae*, as indicated on page 732, and as Prof. Needham has called to our attention by mail; the number given it above is quite conjectural as a statement of his ideas, however.

† This is for the genus *Palæophlebia* described by de Selys from Japan in *Comp. Rend. Soc. Ent. Belg.*, xxxiii, p. clv., for Sept. 7, 1889. There is also a fossil Odonate of the same generic name, described by Brauer, from the East Siberian Jurassic, in *Mem. Imp. Sci., St. Petersburg*, xxxvi, 15, p. 6, "imprimé Mars 1889," and referred by him to the legion Podagrion. Brauer's name apparently having priority, another term must be found for the Selysian genus, and I would therefore suggest **Epiophlebia** from *επιον* and *φλέψ, φλέπος*.

primitiveness of these two suborders (*pace* Dr. Gill) is nowhere distinctly discussed. Expressions supporting the claims of the Zygoptera may be found on pages 719\*, 731 and 732, while the Anisoptera may find comfort on pages 711, 721 and 722. The various groups are nowhere formally defined, and it is not always easy to determine their limits from the references made to them in the text.

"Dynamic control in wing evolution" is considered with especial reference to the formation of bracing veins. In the summary of the article is included a criticism of the present systematic grouping of fossil Odonata with which the writer can well agree, on independent grounds.

The ontogenetic method of study of wing veins which we owe to Professors Comstock and Needham has certainly yielded some striking surprises in the Odonata as well as among other insects. One of these is what Prof. Needham here calls "that most distinctive peculiarity of dragon-fly wings, the crossing of the radial sector [subnodal sector of de Selys and Hagen] over two branches of the media [principal and nodal sectors, de S. and H.] and the development of the bridge" [basal portion of the subnodal sector]. Another illustration is afforded by the true history of the vein whose basal end was termed postcosta by de Selys. In 1893 there seemed to be good reason for believing that it was continued to the wing margin by the "second sector of the triangle," and I considered the two as one and the same vein. Now it is shown that this apparently continuous vein (e. g. in some Zygoptera) is developed from two originally distinct and separate tracheæ.

Finally, attention should be called to the fact that there are numerous suggestions for further research contained in this paper, which its author modestly terms "only a beginning of what should be done in the study of the venation of the order."

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\* "Beyond," in line 14 from the bottom, is apparently an error for "proximal to"

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## Doings of Societies.

At the meeting of the Feldman Collecting Social held April 15th, at the residence of Mr. H. W. Wenzel, 1523 S. 13th St., Philadelphia, eleven persons were present. Mr. H. W. Wenzel read a letter from our fellow-member, Dr. Castle who is now collecting in Florida.

Mr. Biederman spoke on collecting *Arctinotus lucidus* on the Rogue river. He had taken over 20 specimens from February 13th to 21st., the thermometer being from 10 to 12 degrees above zero, and the specimens had evidently just emerged from the chrysalis. They apparently do not fly before 9.30 P. M., and he had never captured it after 1 A. M. He had not suc-